All were to be bathed. They went sounding trumpets; they went blowing shell trumpets; they beat copper discs[10] with pine [hammers].

And all the priests carried on their backs their tobacco bags,[11] and their strings of maguey fiber about the neck, from which went hanging the little bags, which were filled with dyed, powdered tobacco. And the fire priest went ahead of them, taking his incense burner and his maguey thorn. And, with it, he carried his incense bag.

And leading them went a man, an old priest. He went bearing on his shoulders the mist rattle board, called also the sorcerers' staff, which was thick, broad, very wide, and long—very long. And it rattled; he went along rattling it.

No one else remained at the priests' dwelling; the house was all empty, deserted, tenantless.

And only four stayed there—singers, who sat singing, beating the drum, rattling the turtle shell rattle and the gourd rattle, and blowing the shell trumpet. They sat plying the shell trumpet.

And when they had reached the water's edge, the priests' bathing place, where, at the cardinal points, were the mist houses, thereafter all threw themselves down and seated themselves, trembling, shivering, quaking with cold, their teeth chattering.

Hereupon spoke the old man called the old precious stone priest; he said:

"[Behold] the place where the serpents are wrathful, where the water-gnats buzz, the place where the ducks alight, where the white reeds rustle."

When he had thus spoken, thereupon all plunged into the water; they churned it up—beating the water with their hands and with their feet, crying out. Speaking hoarsely, they mimicked all the birds.

Some spoke like ducks, babbling; some mimicked wading birds, speaking like them; some imitated water ravens, talking like them; some talked like [large] herons, some like kingfishers, some like cranes.[12]

Where they bathed, there in their midst were

Vilca, ynoeveemalo, tlapitzalotiuh, qujpitztiuj, in tecziztli, cohcouilac chililitli.

Auh in muchintin tlamacazque, qujmamama yn imiyiequach, ynmecacozquj, inmemecacozquj, itech pipilcatiuh yn imiieiquach, ontetentiuh yiequalli: yoan qujmiacantiuh in tlenamacac, ytlemaiuh ietiuh, yoan yuitz ietiuh: yoan itlan cana icopalxiquipil.

Auh ce tlacatl quacujlli teiacantiuh, qujquechpanotiuh, aiochicaoaztli, no itoca nacalquaujtl, patlaoac, patlactic, patlacpol: yoan viiac, vitlaztic, yoan cacalaca, qujcacalatztiuh

aocac ce onmocauh calmecac, cenjchictiuh, cactimoquetza, cactiuetzi in calmecac.

Auh çan nauhtin in vmpa onmocaoa cujcanjme, cujcatoque, teponaçotoque, aiochiuhtoque, aiacachotoque; qujpitztoque in qujqujztli, qujqujçotoque.

Auh yn oacito atenco, yn jnnealtiaia tlamacazque: nauhcampa in manca yn aiauhcalli, njman ic ic netetoco, aetlalilo, tlacitzitzilca, tlaviujoca, tlacuecuechca, netlantzitzilitzalo:

in ic iulaquj njman ic tlatoa, in vene itoca chalchiuhquaqujlli: qujtoa.

Coatl yçomocaiã, amoiotl ycaoacian, atapalcatl ynechiccanaoan, aztapilcuecuetlacaian:

yn oconjto y, njman ie ic onnetepeoalon atla, tlachachaquatztinemj, yn atlan, tlamaujtectinemj, tlacxiujtectinemj, atlacxiuitectinemj, tzatzitinemj, ycaocatinemj, qujntlaichecalhuja yn inquqjchtin totome:

cequj canauhtlatoa, tlacacauja, ceq'intin qujntlaichecalhuja, in pipitztli, pipitztlatoa: cequjntin qujntlaichecalhuja, yn acacalome, acacalotlatoa: cequjntin aztatlatoa, cequjntin axoquentlatoa, cequjn tocujlcoiotlatoa:

yn vncan maltiaia yn, tlaocpantla manca in cuen-

10. Chililitli: cf. Gabriel Saldívar: Historia de la música en México (México: Editorial "Cultura," 1934), p. 21 [illegible]
11. "Todos llevavan a cuestas, unas taleguillas [illegible] ... papel [illegible] ... (corresponding Spanish text).
Clark (op. cit., Vol. I, p. 57n.) writes: [illegible] ... Cf. also ibid., Vol. II, p. 136.
12. These birds are described in Lib. XI, cap. [illegible] of Sahagún. Cf. Robredo ed., Vol. III, pp. [illegible] ... (Birds of Mexico [illegible], p. 128, [illegible]).

X 796 selves in line and came up the youths and small boys, who offered the old men serpents which they had captured. The old men took these from them and cast them into the fire—everything, whatever they had captured; all the birds—the thrush, the precious thrush, small birds found among the reeds—all the varied kinds of birds; and the water dogs, scorpions, striped lizards, trout, the white fish,[3] the sand fish, crabs, frogs, gulls[4]—all these they cast into the fire.

[136]

[262] Then appeared [the boys], and [the priests] offered each one a *tamal* stuffed with greens. And all the common folk made themselves *tamales* stuffed with greens. They laid them before [the image of] Xiuhtecutli. As many as offered to Xiuhtecutli did so purely voluntarily. And some laid them as offerings only in the tribal temples.

And the *tamales* stuffed with greens they also named precious green stone *tamales*. And all the common folk presented among themselves their *tamales* stuffed with greens; they were presented among themselves. Whoever first cooked her *tamal* of greens then went to offer it to her kin. Thus she showed her self-esteem.

[262] And the sauce of the *tamales* stuffed with greens was a sauce of crabs.[4] And the sauce was called *chamolmolli*. And when the good common folk ate, they stood sweating and burning themselves. And the *tamales* stuffed with greens were very hot and gleaming; and they ate them hot, [so that even] their noses steamed. And the husks they set apart; no one let them reach the fire. They strewed all of them in the water.

[273] And when this was done, when all was eaten, thereupon wine was drunk. It was said: "They are refreshed; the old men refresh [themselves] there in the Temple of Xiuhtecutli." And thus they refreshed [themselves] with wine; they sat drinking and singing until it was dark. Here ended and concluded [the time when] *tamales* stuffed with greens were eaten; the eating of *tamales* stuffed with greens.

X 796 778 And when Incalli came, when twenty days were counted, [this was] when Milintoc roasted something for himself—[he who] likewise [was god of] fire. They also set up his image, which was only a frame-

pipiltzitzinti, quinōnacatimanj, in vevetque, in cuexa in oquimacique: quinoalcuiliuimanj in vevetque, tleco quimonēlaztimanj, yuan in ie inquich, in aquin ça̧o tlein ocacic, in jnquich tetotl, in acatzanatl, in tenexanatl, in acatechichictli, in ie inquich nepapā tetotl, yuan in axoloti, in acaltecpan, in mjlquanechtli, xovili, in amjlotl, in xalmjchi, in acocilin, in cujatl, anenex, moch tleco quimōtlaztimanj:

njmā ic oalquiztimanj, quinoalmacatimani, ocentetl in oauhquiltamalli. Auh inquich tlacatl in macoalli mooauhquiltamalhuja: ixpan ontlamanaia in xiuhtecutli: ça̧n teiollotlama, in quexquj ontlamanaia ixpan Xiuhtecutli: auh in coquiztin ça̧n in cacalpulco in tlamanaia.

Auh in oauhquiltamalli, no quitocaiotiaia, chalchiuhtamalli: auh in jnquich macoalli netech quimomacaia, in inoauhquiltamal: netech motlatlamacaia: in aquin achto oicucic, inauhquiltamal: mec iauh quimacaz in joliolquj, ic quinertia in netla̧otlaliztli.

Auh in oauhquiltamalli in jmollo caica, acocitlatonjlli: auh in tlatonjlli, motocaiotiaia, chamolmolli: auh in jquac tlaquaia macoaltzitzinti, mjltonjtoque, mochichinotoque: auh in oauhquiltamalli, vel tetonquj totontlapextic quitotoncaqua, iaiacapo̧ontoque: auh in jaoaio, ça̧n nonqua quitlaliaia, aiac tleco conaxitiaia: muchi atlan conte̊poaia.

Auh in ie iuhquj, in ontlatlaqualoc, njmā ie ic tlaoano: mjtoa, texcalcevilo, texcalcevia in vevetque in vmpa itrupan xiuhtecutli: auh inje texcalcevia vētli, tlaoantoque, cujcatoque, ça̧n iuh ioon, njcā tlamj ic tzonquj̊ça, in oauhquiltamalli quale, in anoço vauhquiltamalqualiztli.

Auh in onacic Incalli, in jquac tlacempoalti: iquac motlaxqujaia in Milintoc, ça̧n no ie in tletl: no quitlaliaia ixiptla, ça̧n no colotli in quichioaia, conaquja ixaiac, tapachtli in tlachialli, motentlilhuj, in tlili

3. Cf. Sahagún (Robredo ed.), Vol. III, p. 194 (*xalquanechi, xoxali, xoxalotl*); p. 195 (*axoxali, xalmichi*); p. 196 (*acocoxali*); pp. 167-8 (*acatzanatl*); p. 180 (*acochichictli*). *Axolotl* is *Amblystoma dumerilii* according to Gerlach (*Liter. del ajolote*, p. 198), and *Amblystoma mexicanum* (land puppy) according to Clark (*op. cit.*, Vol. II, p. 75); Robert Lehmann-Nitsche ("Ethnologisches und Quasiethnologisch," *Zeitschrift für Ethnologie*, Vol. LXX, p. 76) says it is a "*schlangenähnliche Larche (Perichirotes)*." For *axoxali*, Clark (*op. cit.*, Vol. I, p. 90) has *Cyprinus auratus*; for *xoxalotl* (Vol. II, p. 75) "a white fish like a small eel." Cf. also Seler, *Einige Kapitel*, p. 233.

4. Cf. Sahagún, *op. cit.*, Vol. II, pp. 195-6.

5: Sahagún M-5 (1529-1590) 1953 NU7 Astec NU7

539 Then it became the office of Ecatl to slay the gods. But they say thus: that Xolotl wished not to die. He said to the gods: "Let me not die, O gods." Wherefore he wept much; his eyes and his eyelids swelled.

And when he who dealt death was to overtake him, he fled from his presence; he ran; he quickly entered a field of green maize, and took the form of, and quickly turned into, two young maize stalks [growing] from a single root, which the workers in the field have named *xolotl*. But there, in the field of green maize, he was seen. Then once again he fled from him; once more he quickly entered a maguey field. There also he quickly changed himself into a maguey plant [consisting of] two [parts] called *mexolotl*. Once more he was seen, and once more he quickly entered into the water and went to take the shape of [an amphibious animal called] *axolotl*. There they could go to seize him, that they might slay him.

●[136]

And they say that though all the gods died, even then the sun god could not move and follow his path. Thus it became the charge of Ecatl, the wind, who arose and exerted himself fiercely and violently as he blew. At once he could move him, who thereupon went on his way. And when he had already followed his course, only the moon remained there. At the time when the sun came to enter the place where he set, then once more the moon moved. So, there, they passed each other and went each one his own way. Thus the sun cometh forth once, and spendeth the whole day [in his work]; and the moon undertaketh the night's task; he worketh all night; he doth his labor at night.

From this it appeareth, it is said, that the moon, Tecuciztecatl, would have been the sun if he had been first to cast himself into the fire; because he had presented himself first and all [his offerings] had been costly in the penances.

Here endeth this legend and fable, which was told in times past, and was in the keeping of the old people.

Nimã ic ieh itequiuh ẽmochiuh, in hecatl, ic quinmjctia in teteu: auh in iuh conitoa, in xolotl, amo momiquitlania: quimilhui in teteu. Macamo nimiqui teteuie. Ic cẽca chocaia, vel itopoçaoac, iquauelpoçaoac.

Auh in ie itech onaci miquiztli, çan tripãpa eoac, cholo, tocitlan calactiuetz: ipan ommixuch, ic mocuepiuetz, in toctli ome manj, maxaltic: in quitocaiotia millaca, xolotl. Auh vncan ittoc in tocitlan: ie no ceppa teispampa eoac, ie no cuele metitlan calactiuetz: no ic ẽmocuepiuetz in metl, ome manj, in itoca mexolotl. Ie no ceppa ittoc, ie no cuele atlan calactiuetz, axolotl mocuepato: ie vel vmpa canato, inic conmictique.

Auh quitoa, in manel mochintin teteu omicque, ça nel amo ic olin, amo vel ic otlatocac in teutl tonatiuh: ic itequiuh ommuchiuh in hecatl, moquetz in ehecatl, cenca molhui, totocac, in ehecat: quin ieheatl vel colinj, nimah ie ic otlatoca. Auh in iconc, ie otlatoca, çan vmpa ommocauh in metztli: quinicoac in ocalaquito icalaquian tonatiuh, ie no cuele ic oalcoac in metztli: ic vncan mopatilique, motlallotique. Inic ceppa oalquiça tlacemilhuiltitia in tonatiuh: auh in metztli iooalrequitl quitlaça cẽoual quitlaça, iooalrequiti.

Ic vncã hin neci, mitoa: ca iehoatl tonatiuh iexquia in metztli tecuciztecatl, intla ic achto onuetzinj tleco: ipampa ca iehoatl achto misquetz, inic muchi tlaçotli ipan tlamacoth.

Nican tlami, in hin nemonoztalli, çaçanilli: in ie uecauh ic tlatlanonotzaia, vnietque, in impiel catca.

Eclipse of the Moon.

821 843 When the moon eclipsed, his face grew dark and sooty; blackness and darkness spread. When this came to pass, women with child feared evil; they thought it portentous; they were terrified [lest], perchance, their [unborn] children might be changed

Metztli qualo.

In iconc, qualo metztli: ixtlilcoa, ixcuichcoa, cuicheoxtimomana, tlaiocatimomana. In iconc, y, muchioa: uel motẽmatia in ocoxtin, tlauxtimatia, momauhtiaia: ma nelli moquimichcuepti, ma qujquimichtinmocuepti, in impilhoan.

6: Sahagún M-5 (1529-1590) 1954 NU7 Aztec NU7

SEVENTH PARAGRAPH, in which is told how the singers bedizened themselves when the ruler would dance; and of that in which they would dance.

Mixcoacalli: there were established all the kinds of singer-dancers of Tenochtitlan and Tlatilulco. There they awaited the word of the ruler, that he would dance, or try some song, or learn some new song. All this the singers prepared, all that was necessary—two-toned drums, rubber drum hammers, ground drums, rattles shaped like dried poppy heads, copper bells, flutes; players of two-toned drums and ground drums, intoners of chants, leaders of the dance; and all the properties used in the dance.

If the song were to be intoned after the manner of Uexotzinco, they were adorned like men of Uexotzinco, and spoke even as they did; they were imitated with the song and in their adornment and their equipment. Likewise if a song were to be intoned after the manner of Anauac, the speech of the men of Anauac was imitated, and their adornment as well as their equipment. Likewise, if a song were to be intoned after the manner of the Huaxteca, their speech was imitated, and their headdresses were taken, with which to imitate them in coloring their hair yellow; and the masks [had] arrow marks [painted] on the face, noses pierced like jug handles, teeth filed [to a point], and conical heads. And they [were clad] only in their capes. Likewise [they did] other songs.

INJC CHICOME PARRAPHO, vncā mjtoa, injc mocencaoaia qujcanjme, in tlamaceoaz tlatoanj: ioan in tlein ipan mjtotizque. 533 292

Mixcoacalli, vncan tecpanoaia in jzqujtlamantli, mācehoalcujcanjme in tenochca, iyan tlatilulcatl, vncan qujtlatolchiaia in tlatoanj, ir aço māçeoaz, aço itla cujcatl qujiehecoz, aço itla iancujc cujcatl qujnomachtiz, mochi ic meçencauhticatca, in cujcanjme: in jxqujch monequj teponaztli, olmaitl, veuetl, aiacachtli, tetzilacatl, çoçolocrli, teponaçoanj, veuetzonanj, cujcaitoanj teiacanque: ioan in ixquich tlamantli mācehoallarqujtl, [534]

intla uexotzincaiotl meoaz cujcatl, in iuh muchichioa vexotzinca, ioan in iuh tlatoa: motlaiehecalhuja in jca cujcatl: ioan ica inechichioal intlaquj. Çan no iuhquj intla anauacaiotl meoaz, motlaiehecalhuja, in jntlatol anaoaca: ioan jnnechichioal in iuhquj intlatquj. Çan no iuhquj, intla cuextecaiotl meoaz cujcatl, motlaiehecalhuja in jntlatol: ioan mocuj tzoncalli in qujntlaiehecalhuja, intzon, injc quacoztique, ioan xaiacatl ixtlamjoa iacaujcole, tlantziquatic, quapatlachtic, içan jtilma. Can no iuhquj in oc cequj cujcatl.

[302 304]

EIGHTH PARAGRAPH, which telleth of the houses in which were the slaves.

Malcalli: the majordomos guarded[13a] the captives. They took great care of them as to food and drink. That which they needed, they gave all to the captives.

Totocalli: there majordomos kept all the various birds—eagles, red spoonbills, trupials, yellow parrots, parakeets, large parrots, pheasants. And there all the various artisans did their work: the gold and silversmiths, the copper-smiths, the feather workers,[14] painters, cutters of stones, workers in green stone mosaic, carvers of wood. Caretakers of wild animals,[15] majordomos, there guarded all the wild animals: ocelots, wolves, mountain lions, and mountain cats.

INJC CHICUEJ PARRAPHO, ipan tlatoa, in jnchan catca tlatlacoti 567 344

Malcalli: calpixque pinpiaia, in mamalti, cenca quinmocujtlaujaia, in tlaqualtica, in atica: in tlein quinequja, mochi quinmacaia in mamalti.

Totocalli, calpixque vncan qujnpiaia, in jxquich nepapan tototi: quaquauhti, tlauhquechol, çaquan, tozneneme, cochome, alome, coxoliti: ioan oncan tlachichioaia, in jxqujch nepapan toltecatl, in teucujtlapitzquj, in tepozpitzquj, in amanteca, tlacujloque, tlatecque, chalchiuhtlacujloque, quauhtlacujloque Tequanpixque, calpixque, vncan qujnpiaia, in jxqujch tequanj: oçelotl, cuetlachtli, mjztli, ococtochtli. 463 344 231 136

13a. *Pinpiaia*: probably *quinpiaia* is meant.

14. "Feather-workers were called *amanteca* after the district of Amanolan, in Tonalitlan, where they lived" (Clark, *op. cit.*, I, p. 56, n. 2). Cf. also Seler, *Einige Kapitel*, p. 378.

15. The *Real Academia de la Historia MS* has *nepanpixque* for *nepanpixque*, and begins with the term a new paragraph. A marginal gloss by Sahagún heads the section, "*Casa de las fieras.*"

[p.46 is blank]

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of a few old people of Totolapan (San Miguel). According to the "Relación de Citlaltomáua," the area in which Cuitlatec was spoken extended in the southeast as far as vanished Chiantepec,[*] and fragments have been recorded by Weitlaner in coastal Atoyac.

Provincial borders in 1519.—The borders of Çihuatlan are as unclear as its linguistic features. Zacatula must have represented approximately the westerly outpost. Somewhere in the pathless mountains all along the north of Çihuatlan was the border between this province and the Tarascans and Cuitlatec. (The Cuitlatec seem to have been an entity distinct from both their powerful neighbors, Mexican and Tarascan.) A slender link through Otlatlan (modern Otatlán), in the fellow-tributary province of Tepequacuilco, bound Çihuatlan to the Empire, and to the east lay the never-subdued Yopes.[**]

TRIBUTE

In the records of tribute presented for this and the following thirty-seven provinces, the frequency of payment is indicated as follows: one asterisk, annual; two asterisks, semiannual. The few quarterly payments ("de ochenta en ochenta días") are noted.

Tribute of the whole province.—According to the *Matricula* page and its copy in the *Mendocino*, the following items of tribute were exacted from the province of Çihuatlan:

CLOTHING**

1,616 bundles[***] of large orange mantles
2,400 bundles of large mantles of "twisted" cloth

FOOD**

80 loads of cacao bermejo

OTHER GOODS**

400 bundles of cotton
800 red seashells, like scallops

[*] See the preceding note. On Cuitlatec see Hendrichs, "Un estudio preliminar sobre la lengua cuitlateca de San Miguel Totolapan, Guerrero," *El México Antiguo* (1939), 4: 329–362; Weitlaner, "Beitrag zur Sprache der Ocuilteca," *ibid.*, pp. 297–328, notes; and McQuown, "La fonémica del cuitlateco," *ibid.* (1941), 5: 239–254.

[**] See section on Tepequacuilco, below.

[***] The *Mendocino résumé*, in Spanish, has been followed throughout this study as a convenient guide on tribute. There are slight inaccuracies in the version it gives of numbers, however; the figures representing single units are consistently overlooked. Here I have corrected the figure from the erroneous "1,600."

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127 Bernardino de Sahagún (1499–1590), who came to Mexico in 1529. It is unfortunate that there is still no complete edition of this work in a European language. The Spanish version, written by the author toward the end of his life, was not published until the early 19th century, and is in part a condensation of the Nahuatl work written about 1547. This is particularly true of Book Eleven, which contains most of the natural history, and has therefore attracted less attention from scholars than the books dealing with ceremonies and the calendar. The edition by Anderson and Dibble (1950–54), which gives Nahuatl and English in parallel columns, has not yet reached Book Eleven, so we must rely on the 1938 Robredo edition of the Spanish text, while the illustrations 127 are to be found in the Madrid edition of 1905–07. Sahagún's vertebrate ●136 zoology has recently received careful treatment at the hands of Martin del Campo (1938, 1940, 1941). Some of the flavor of his ornithology can be given by "listening to the mockingbird" (actually the curved-bill thrasher, *Toxostoma curvirostre*) when he sings in Nahuatl:

"There is a bird in this country called *cuitlacochtótotl* or *cuitlacochin;* it has longish and slender feet, and a thin and sharp beak, somewhat [825] curved; it is of a muddy color, tending toward purplish; it sings very well; it is so called by reason of its song, which says *cuitlacoch, cuitlacoch, taratitarat, tatatati, etc.*" (Robredo edition, vol. 3, p. 189).

127 Sahagún's botany will not be discussed here, since it appears not to bear significantly on limnology. It is treated from the medical point of view by Alcocer (1938) in an appendix to the Robredo edition. Aztec medical botany, however, is much more thoroughly covered in Emmart's magnificent edition (1940) of the de la Cruz-Badianus herbal of 1552, and in a memoir by Paso y Troncoso (1886), while Sahagún's general botany is competently treated by Rivera (1941).

A general impression of Sahagún's work is that it is the achievement of a man who knew no natural history when he came from Spain, but whose consuming passion for all things Mexican drove him to learn and record all he could from native informants. If so, we are entitled to read between the lines an enormous amount of information that was not recorded. It is of course no new discovery that "primitive" people are very skilful naturalists. Raymond Paynter informs me that more kinds of Yucatecan birds are named in modern Maya than in Latin, and ethnographers have repeatedly found natives to be better naturalists than themselves. This does not diminish the fact that the lacustrine flora and fauna were exceedingly well known to the Aztecs of the Valley of Mexico, many of whom spent most of their lives in canoes and depended on limnologic knowledge for their livelihood. And, though the available sources emphasize the economic basis of this knowledge, so that "comenlos"—"they eat them"—is a monotonous refrain in

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Sahagún, it does not follow that Aztec limnology was exclusively motivated by exploitation. Scientific curiosity in the modern sense was not a dominant quality of 16th-century Spain, and the stress on practical matters is at least as likely to be a property of the Spanish as of the Aztec mind. Moreover, as Maldonado-Koerdell (1946) points out, an essential basis of Aztec interest in natural history, at least in vertebrates and plants, was magical and totemic.

FAUNA. It is characteristic, and exasperating, to find that Sahagún's Chapter 12 "De las diversidades de las aguas" discusses the sea, the rivers, and the springs, and omits the lakes. A much more impressive amount of limnologic information is given in Chapter 2, with its list of 41 aquatic birds, practically all of which can be identified (Martin del Campo, 1940). Nahuatl names and brief descriptions are given, but what is more important is that food habits are listed for nearly every species, and that most of them are illustrated. Chapter 3 deals with aquatic animals, including crustaceans, turtles, amphibians (including the axolotl), the marine iguana, and a disappointingly short list of fishes. Crocodiles are separated off with several mythical water creatures in Chapter 4, "De otras animales del agua que no son comestibles". Since Sahagún wrote in the century of Gesner, we need not be surprised to find a certain amount of credulity displayed; the account of the *pacapitzanac* or *nacatzone*, a bird (the eared grebe, *Colymbos nigricollis californicus*) that subsists on its own feathers, is particularly enchanting.

Fishing on Lake Texcoco is probably not what it was before the Valley lakes were finally lowered in 1900, but statements that the salt lake is lacking in fishes are erroneous. At the time of the Conquest, the Anonymous Conqueror remarked "in the sweet water there are some small fish; in the salt part they are still smaller" (1917 edition, p. 59). Cortés, on the other hand, tells us that the fisheating birds in Montezuma's menagerie were fed daily on two hundred and fifty pounds of fish, caught in the salt lakes (MacNutt edition, 1908, vol. 1, p. 266). The two statements do not conflict, since small but numerous members of the families Atherinidae and Goodeidae were doubtless the staples of the fishery. The aboriginal methods of fishing may be seen within a few miles of Mexico City today, as Linné shows (1937, 1948). All are illustrated in the Florentine Codex, i.e. the work of Sahagún, and in the fascinating pictures that decorate the mid-16th-century map "attributed to Alonso de Santa Cruz", now in the library of the University of Uppsala. This map serves as the focal point of Linné's remarkable book (1948), which synthesizes archaeologic, historic, and ethnographic knowledge into a convincing picture of the Valley of Mexico in 1550.

The fishing methods include rod-and-line, nets of two of three sorts,

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The most famous of the edible invertebrates is the *axayácatl*, referred to as *axaxayácatl* by Sahagún and Hernandez. Although modern writers (Vaillant, 1941; Apenes, 1943; Linné, 1948; Anderson and Dibble, 1954) persist in calling these insects flies, it has been known for more than a century that they are corixid waterbugs. Sahagún's Spanish word was *coquillo*, not *mosco* or *mosquillo*, so the confusion is not his fault. In post-Conquest times the dried adult insects have been widely sold in the markets of the world as food for caged birds, but they were also used as human food; Hernandez says that they were cooked in maize leaves in nitrous water. Hernandez also makes it clear that these insects are the source of *ahuautli*, a cake made from the eggs that is still much eaten in Mexico, particularly on watch-nights such as Christmas Eve and Holy Thursday. That *ahuautli* was formerly a staple that survives as a delicacy is suggested by its name, which is derived from *atl*, water, and *huautli*, amaranth seed. Now that Sauer (1950) has cleared up some of the indescribable confusion surrounding the use of grain amaranths in aboriginal Mexico, we can begin to appreciate that *ahuautli* was really "water grain", though not in the literal sense of "water wheat" implied by Tylor (1861), whose etymology has confused such later writers as Packard (1871). The identity of the insects is an equally tangled bibliographic problem in which the zoologists have hardly been more helpful than the historians.

The fullest and most authoritative-sounding account is that of Orozco y Berra, given in his memoir on the hydrography of the Valley of Mexico (1864). This historian quoted in full de la Llave's description (1832; reprinted 1887) of the adult insect under the name *Ahuautlea mexicana* (which appears to be the correct name, though it has been ignored by zoological writers; it has priority over the generic name *Krisousacorixa* Hungerford 1930 and the specific name *Corixa femorata* Guérin-Meneville 1857). He described the cultivation of *ahuautli*, which is accomplished by placing bundles of *tules* (*Scirpus* or *Typha*) in the water of Lake Texcoco, stripping off the eggs which the insects lay in countless millions, and processing them into cakes. This much of Orozco y Berra's work is correct; it is fully confirmed by the modern observations of Ancona (1933), and, if there is any doubt that the practice is an aboriginal one, the doubt is removed by Sahagún's figures, reproduced in Plate I, nos. 220–221. Professor Hutchinson assures me that no. 220 is certainly the oldest known figure of a corixid waterbug. Oddly enough, Sahagún does not describe the practice or mention *ahuautli* with the edible insects in Book Eleven, though he lists it among the products sold in the market in the 19th chapter of Book Eight. Hernandez repairs the omission.

Ancona's account (1933) is the only one by a modern zoologist, and

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127 suggests that the *axayácatl* is ordinarily *Krisousacorixa azteca* Jaczewski, 1931; it may also be *K. femorata* (Guérin-Meneville, 1857), while 136 *Corisella texcocana* Jaczewski and *C. mercenaria* (Say) may be less important components of the market product, along with the backswimmer *Notonecta unifasciata* Guérin-Meneville. Which species contributes most eggs to *ahuautli* is not made clear even by Ancona's paper, although it is certainly one of the species of *Krisousacorixa*.

Unfortunately Orozco y Berra went on to confuse the issue by discussing the *cuculin*. This word does not occur in Sahagún's text, so far as I have been able to discover, though it is mentioned by Hernandez, by Alvarado Tezozomoc (Orozco y Berra's edition, p. 236), and by Pomar in his *Relación de Tezcoco* (García Icazbalceta's edition, 1891, p. 59). Orozco y Berra considered it to be composed of "nests" of the "larvae" of the *axayácatl*, which come to the surface under circumstances unknown and are scooped from the water and made into cakes. The "larvae", furthermore, are said to be eaten as *puxi*, so that the miraculous corixids are eaten in four different forms under as many names. Corixids, of course, have neither larvae nor nests, and it appears that Orozco y Berra attributed to the *axayácatl* some of the properties of the insect products *cuculin* and *izcauitli* and of the vegetable product *tecuitlatl*. I have not traced the word *puxi* back of Orozco y Berra, but the *cuculin* and the *izcauitli* appear to be pupal and larval stages, respectively, of a salt fly, probably *Ephydra hians* Say. Sahagún describes the *izcauitli* as having "no head, but two tails, and reddish", and the featureless animals shown in Plate I, no. 223, certainly do not disagree with that description.[8] At the risk of introducing still another false etymology I suggest that the name itself has something to do with salt, *iztatl*, but in any case Pomar's description, in the *Relación de Texcoco*, written in 1582 and published by García Icazbalceta in 1891, leaves little doubt that a salt fly is meant: "There grows another sort of food called *ezcauhtli*, which is made of certain little grubs like earthworms, so slender and so pullulent in their multitude and density, that one can scarcely judge whether or not the substance is alive" (p. 59). Salt-fly larvae are almost the only grubs that would occur in such quantities in

[8] In the original codex (of which there is a photostatic copy in the Yale library) the illustrations are interlarded with the Spanish text, and not separated as in the published editions. This arrangement is of little help in identifying the animals, as the association of pictures and text appears to be arbitrary, probably through the copyist's mistake. Thus, while Figure 223 stands with the *ocuiliztac*, making it conceivable that this, and not *izcauitli*, was Sahagún's word for Ephydrid larvae, Figure 220 stands with *axaxayácatl*. The subsequent paragraph on *axaxayácatl* contains Figure 221, making it clear that the location of Figure 220 is a mistake.

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a salt lake, and Aldrich (1912) gives a graphic account of *Ephydra gracilis* Packard on the Great Salt Lake, Utah, and of *Ephydra hians* on Mono Lake, California. The latter are not only collected in quantity and eaten by Paiute Indians, but were bred out of supposed "larvae" of the *axayácatl* of Lake Texcoco by Peñafiel (1884) and identified by Williston, who referred to Peñafiel's specimens in 1883 and again in 1896. Even Ancona overlooked the fact that Peñafiel's larvae could have nothing to do with a corixid, so that Aldrich's remark, "it seems that the Diptera and the Hemiptera are mingled together in the quotations", is an understatement.

The pupae of ephydrids come to the surface and undergo mass emergence, and it is then (in September) that they are collected and processed as *kootsabe* by the Paiutes of Mono Lake. In all probability this is the product that the Aztecs called *cuculin*. (The words sound distantly related, which is not inconceivable, as Paiute is a member of the Uto-Aztecan linguistic group). The substance is definitely confounded with *tecuitlatl* by Orozco y Berra, however, and the suggestion that it is made of the pupae of *Ephydra hians* is made with due hesitation. As Aldrich said, "only an investigation by an entomologist at the lake can clear up the confusion" (1912, p. 92). Though Sahagún does not mention *cuculin*, nos. 224 to 227 in Plate I appear to depict stages in its manufacture, or in the collection of the larvae, *izcauitli*.

The puzzling stuff called *tecuitlatl* is mentioned by Sahagún in Book Eight, and listed (as *tecuiltlatl*) with the lower animals in Book Eleven. He describes it as "*arronas*" ("*urrosas*" in Lord Kingsborough's edition (1831–48), but neither form occurs in any dictionary I have consulted nor does my own reading "orroras") which grow on the water, have a purple color, and are harvested, dried on mud, and made into cakes. Anderson and Dibble translate the Nahuatl word as "scum", and the material is probably algal. Pomar (García Icazbalceta's edition, p. 59) refers to it as "green sheets that grow, which, when made into a cake and baked, take on a dark green color, and which the Spaniards call *queso de la tierra*". Hernandez, who lists it among the minerals, confirms the purple or green color ("color adhuc recenti cyaneus, aut viridis"). López de Gómara, who was never in Mexico, but who published in 1552 a delightful book on the Conquest that has been a best-seller for four hundred years, adds the suggestive detail that the substance (which he does not name) was gathered on "threshing floors" (*eras*) like those in which salt is made. He said that it is eaten as we eat cheese, and described its flavor as salty, but very good with *chilmolli* (1943 edition, pp. 238–239); continuing with the sonorous text of the first English edition (1578, reprinted in facsimile 1940) from

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which the above details are omitted, "yea, and they holde opinion that this skume or fatnesse of the water, is ye cause that such great number of foule cometh to the lake, which in the winter season is infinite."

Linné (1948), who considers that the substance was an alga that is no longer used, identifies it with the cakes that Bernal Diaz del Castillo saw being sold in the market at Tlatelolco, and which he described as having a cheeselike flavor (1928 edition, p. 300). It is not improbable that Diaz' cakes were made of corixid eggs, *ahuautli*, and it is conceivable that Sahagún's substance was also, though the reference to purple color makes it unlikely. If purple *Oscillatoria* or *Nostoc* were used as food at the time of Conquest, they are doubtless so used today, but the scene of the harvest may be expected to have shifted with the changing salinity of the Valley lakes and the decline of native salt manufacture.

The remaining invertebrates on Sahagún's list have drawn no attention from historians, and, possibly for that reason, they can be identified with some confidence. The *acocili* is clearly a crayfish, presumably *Cambarellus montezumae* (Saussure), and this is the modern Mexican name for that animal (DeBuen, 1944 a; Villalobos, 1943). Sahagún distinguishes it from the *camarón*, or shrimp (*Macrobrachium* or *Palaemon*), and discusses the latter in another part of the chapter, though without giving its Nahuatl name. Plate I, no. 219, leaves no doubt of the identification. In that figure it is accompanied by a dytiscid beetle larva, and this is presumably the *ocuiliztac*, which are "muy ligeros en el agua". Finally, the *aneneztli*, which "turns into those bugs (*coquillos*) that have four wings and fly, and are called hawks (*gavilanes*) in Castile", is almost certainly a dragon-fly larva (Odonata). No. 222 in Plate I appears to represent the adult.

One point should not escape notice, in this melancholy record of confusion: four centuries of scholarship have not sufficed to bring limnologic knowledge of the Valley of Mexico up to the stage attained by the Aztecs and used by them in their daily lives.

CHEMISTRY. An inorganic product of the lakes that was also fully exploited was salt. Ethnographic data on saltmaking have been collected by Apenes (1944), and the importance of salt in aboriginal economy has been extensively discussed by Mendizábal (1929; reprinted in the *Obras Completas*, 1946). The latter author points out that evaporation by artificial heat is a practice introduced by the Aztecs and other high cultures of the highlands, and that the archaic method of solar evaporation survives in those areas less subject to Aztec domination. A standard feature of the more sophisticated method is the separation of silt by settling and filtration from the water to be evaporated, and today

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Plate I.

127 Nos. 218–227 from the Codex Florentino (Sahagún, 1905–07), illustrating parts of Book Eleven "Of the properties of animals, birds, fishes, trees, herbs, flowers, metals, and rocks, and of colors". No. 218, the first figure of the axolotl, *Amblystoma mexicanum*; No. 219, *a*, the crayfish, *acocili*; *b*, a dystiscid larva, presumably the *ocuiliztac*; Fig. 220, the first figure of a corixid waterbug, the *axayácatl*, *Ahuautlea mexicana* de la Ilave (?=*Krissonascorixa azteca* Jaczewski); 221, the *axayácatl* laying its eggs (*ahuautli*) on a cultch of reeds; No. 222, presumed to be Odonata and identified as *auenezili*; No. 223, presumed to be the ephydrid larvae (*Ephydra hians* Say) with which the *izcauitli* is identified; Nos. 224–225, presumably the harvesting of *cuculin* (not mentioned in Sahagún's text), identified as probably ephydrid pupae; Nos. 226–227, possibly continuing the subject matter of the previous two pictures, or perhaps depicting the harvest and manufacture of the algal cake *tecuitlatl*.

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222

[end plate I. a]

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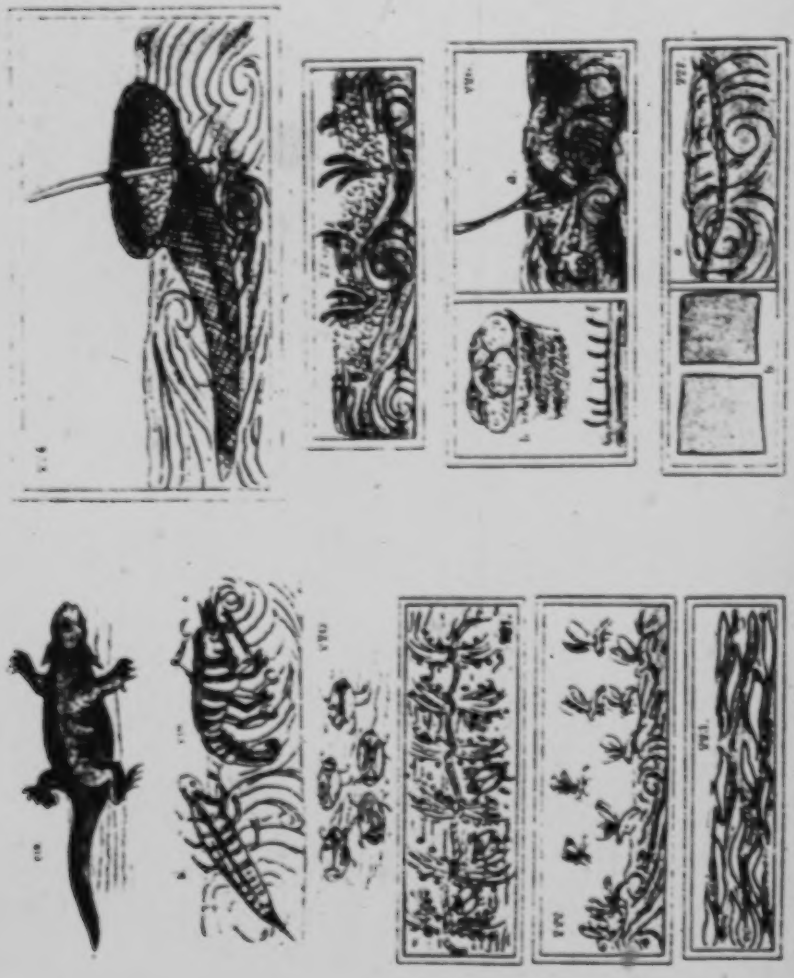

[End plate I b]

11:Diaz T,H-5 (1519-1520) 1910
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zuma had two houses full of every sort of arms, many of them richly adorned with gold and precious stones. There were shields great and small, and a sort of broad-swords, and others like two-handed swords set with stone knives which cut much better than our swords, and lances longer than ours are, with a fathom of blade with many knives set in it, which even when they are driven into a buckler or shield do not come out, in fact they cut like razors so that they can shave their heads with them. There were very good bows and arrows and double-pointed lances and others with one point, as well as their throwing sticks, and many slings and round stones shaped by hand, and some sort of artful shields which are so made that they can be rolled up, so as not to be in the way when they are not fighting, and when they are needed for fighting they let them fall down, and they cover the body from top to toe. There was also much quilted cotton armour, richly ornamented on the outside with many coloured feathers, used as devices and distinguishing marks, and there were casques or helmets made of wood and bone, also highly decorated with feathers on the outside, and there were other arms of other makes which, so as to avoid prolixity, I will not describe, and there were artizans who were skilled in such things and worked at them, and stewards who had charge of the arms.

Let us leave this and proceed to the Aviary, and I am forced to abstain from enumerating every kind of bird that was there and its peculiarity, for there was everything from the Royal Eagle and other smaller eagles, and many other birds of great size, down to tiny birds of many-coloured plumage, also the birds from which they take the rich plumage which they use in their green feather work. The birds which have these feathers are about the size of the magpies in Spain, they are called in this country

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231 *Quezales*, and there are other birds which have feathers of
●136 five colours—green, red, white, yellow and blue; I don't remember what they are called; then there were parrots of many different colours, and there are so many of them that I forget their names, not to mention the beautifully marked ducks and other larger ones like them. From all these birds they plucked the feathers when the time was right to do so, and the feathers grew again. All the birds that I have spoken about breed in these houses, and in the setting season certain Indian men and women who look after the birds, place the eggs under them and clean the nests and feed them, so that each kind of bird has its proper food. In this house that I have spoken of there is a great tank of fresh water and in it there are other sorts of birds with long stilted legs, with body, wings and tail all red; I don't know their names, but in the Island of Cuba they are called *Ypiris*, and there are others something like them, and there are also in that tank many other kinds of birds which always live in the water.

[346] Let us leave this and go on to another great house, where they keep many Idols, and they say that they are their fierce gods, and with them many kinds of carnivorous beasts of prey, tigers and two kinds of lions, and animals something like wolves which in this country they call jackals and foxes, and other smaller carnivorous animals, and all these carnivores they feed with flesh, and the greater number of them breed in the house. They give
782 them as food deer and fowls, dogs and other things which they are used to hunt, and I have heard it said that they feed them on the bodies of the Indians who have been sacrificed. It is in this way: you have already heard me say that when they sacrifice a wretched Indian they saw open the chest with stone knives and hasten to tear out the palpitating heart and blood, and offer it to their Idols
782 in whose name the sacrifice is made. Then they cut off
2.66

11:Diaz T,H-5 (1519-1520) 1910
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the thighs, arms and head and eat the former at feasts and banquets, and the head they hang up on some beams, and the body of the man sacrificed is not eaten but given to these fierce animals. They also have in that cursed house many vipers and poisonous snakes which carry on their tails things that sound like bells. These are the worst vipers of all, and they keep them in jars and great pottery vessels with many feathers, and there they lay their eggs and rear their young, and they give them to eat the bodies of the Indians who have been sacrificed, and the flesh of dogs which they are in the habit of breeding. We even knew for certain that when they drove us out of Mexico and killed over eight hundred of our soldiers that they fed those fierce animals and snakes for many days on their bodies, as I will relate at the proper time and season. And those snakes and wild beasts were dedicated to those savage Idols, so that they might keep them company.

Let me speak now of the infernal noise when the lions and tigers roared and the jackals and the foxes howled and the serpents hissed, it was horrible to listen to and it seemed like a hell. Let us go on and speak of the skilled workmen he [Montezuma] employed in every craft that was practised among them. We will begin with lapidaries and workers in gold and silver and all the hollow work, which even the great goldsmiths in Spain were forced to admire, and of these there were a great number of the best in a town named Atzcapotzalco,[1] a league from Mexico. Then for working precious stones and chalchihuites, which are like emeralds, there were other great artists. Let us go on to the great craftsmen in feather work, and painters and sculptors who were most refined; from what we see of their work to-day we can form a

[1] Escapuçalco in the text.

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tomatoes, the cylindrical ones;[4] and all the neck beads, and the matted neck beads; and large and small pieces of turquoise; and all the different kinds of feathers — quetzal tail feathers: the well-pointed ones, the well-curved ones, the wide ones, the long ones, which, they said, indeed extended a fathom. And these were just the tail feathers. And those they called down feathers,[5] the very small ones, the chili-green ones and the crest feathers of the quetzal;[6] and feathers of the red spoonbill[7] [*teoquechol*], which is now called *tlauhquechol*; and the blue cotinga, the amethyst-colored ones,[8] the yellow parrot,[9] the multicolored parrot, the trupial,[10] the red and yellow parrot,[11] the scarlet parrot,[12] the blue parrot,[13] the dove; and aquamarine feathers, etc. And skins of wild animals, and mats of wild animal [skins]; and wooden chocolate-beaters; and gourd stoppers.[14]

Verily, all their goods, which lay strewn [and scattered in the tribal quarter] temples[15] they arranged in order and in rows upon precious capes. They sorted, ordered, and disposed them. Then they offered incense and beheaded quail. Of this it was thus said: "They place things in the sun." And when they had placed them in the sun, and when they had offered incense during the day, later,[16]

in vel iaque in vel vitoliuj, in patlanac, in viiac, in quilhuja ceaciacatl içan moteca: auh in çan tosacujtlapiltic, ioan in quilhuja quetzaliacatl, in çan tepitoton, in chilchotic, ioan in tzinjtzcan, in teoquechol: in azcan mjtoa tlauhquechol, ioan in xiuhtotoctl, in aiopal, in toatli, in tosacujcujl, in çaquan, in cochoivitl, in chamolin, in cujtlatezotli, in coçóli, in xiuhapalli. Etc. yoan in tequanecatl, in tequanpetlatl, auh in aquaujtl, in atzaccaictl:

in ie mochi intlatqui in teintoc, [ỹ pixauhtoc. yn calpulco] in teucali, tlaçotilmapan quicentecaia, quicuecuentiliaia, quitlatlamantiliaia, quiviujpanaia, quitetecpanaia, vncan tlenamacaia, tlacotonaia, iehoatl inic mjtoa: tlatotonja, auh in jquac otlatotonjque, in otlenamacaque, cemjlhuitl, catepan tlatlaquaio, aatlioa, mopixtoque, in pochteca veuetque, nepiélotoc, tlachichinalotoc, tlanecutoc, tlasujaxtoc, puctleoztoc,

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6. Cf. *Florentine Codex*, Book XI, cap. viii, fol. 295: *ceyo tlatlalli, xiuhtic, ocuitic xiuitic, tenuitic, chiquipatlatic, tlachiquinahuhtli, tlachiquinalli, tlacotonalli, tlachichinolchichiltili*, for which the corresponding Spanish text reads: "*Labrense estas piedras unas redondas y esparcidas, otras largas y rollizas, y esparcidas, otras triangulares, otras cornudas di ansga, otras anahuadas.*"

7. Quetzal tree plog, in Jotn, *loc. cit.*

8. *Tzinitzcan*. Sahagún (Garibay ed.), XI, 2, 2 and 4, describes both the crest of the quetzal and a bird of the same name: *Tzinitzcan mocuecuexi, T. amilogaxi* (*ibid.*, Vol. IV, p. 366). In Sahagún, *Collected Works* (), Eric S. Thompson and Francis B. Richardson, eds.; Cambridge: Carnegie Institution of Washington, 1959), Vol. V, p. 2, it is quetzal tail and *tlauhtlan* feathers of dark green with metallic sheen; in *ibid.*, Vol. II, Pt. 3-4, p. 137, a bird with black and green feathers.

9. *Tlauhquechol*. In *ibid.*, Vol. IV, p. 62, white and red spoonbill; Vol. II, Pt. 3-4, p. 63, red heron; p. 124, red spoonbill; p. 127, rose-colored heron. Cf. also Sahagún (Garibay ed.), XI, 2, 5; *Ajaxe ejaqui* (*ibid.*, Vol. IV, p. 356).

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10. Sahagún (*op. cit.*, XI, 2, 9) mentions an ayoquani found in mountains above Cuernavaca and Michoacan — of painted, black beak and black feathers except those of the tail, which are half-white; another kind of the same name is a waterfowl of yellow beak; feathers at joint of wing are green, long wing and tail feathers are brown, with white and green; body feathers are red. *Ayaxmic ayaxni* (*ibid.*, Vol. IV, p. 324).

In "L'ordinaire des anciens mexicains et leur art de travailler la plume et de faire des ornements en plumes," Congrès International des Américanistes, *Compte-Rendu* de la Huitième Session Tenue à Paris en 1890 (Paris: Ernest Leroux, 1892), note to § 68, Eduard Seler translates *ayoquí* as *tripan ostjanie*, referring to Malina, *op. cit.*, *chrissé amarilla — zapadelobkoi*.

11. Seler, *Collected Works*, Vol. IV, p. 33. Cf. also Sahagún (Garibay ed.), XI, 2, 14; Santamaría, *op. cit.*, Vol. III, p. 210.

12. Seler, *op. cit.*, Vol. II, Pt. 3-4, p. 114. *Quetzaltototl, Motzcuauhtic* (Sahagún, Garibay ed., Vol. IV, p. 372).

13. Seler, *op. cit.*, Vol. IV, p. 33. *Tozan-cuic*, *op. cit.*, Vol. I, p. 371: "*especie de loro, del género Chrysotis.*" *Cuchi ce cuchuí* — "*Papagayo rojo y morado.*" *Amaxcana alchiyoc alchiyoc* (Sahagún, *op. cit.*, Vol. IV, p. 328).

14. *Ibid.*, IX, 1, 2. Cf. also, however, *chamolin* (*chamal*) in Santamaría, *op. cit.*, Vol. I, p. 461: "*Hombre vulgar que en el Estado de Guerrero, en Méjico, se da al saltador o chanchistchid.*" *Chamolchistchid*. Aut., *chamolli* (*planta*) — "*tabaco o flor del camarón* (Peristeria pulcherrima)."

15. Cf. Sahagún, *loc. cit.*

16. Corresponding Spanish text: *empedrava de galapagos para mexicanos*.

17. An omission in the *Florentine Codex*, to be noted in comparing the passage with the text of the *Real Palacio MS*, placed in brackets, brings the Nahuatl closer to Sahagún's corresponding Spanish.

18. *Campos*: the nobility is missing in the original.